

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

REDISCOVERY AND DESCRIPTION OF THE
ICTALURID CATFISH, *NOTURUS FLAVIPINNIS*

BY WILLIAM R. TAYLOR, ROBERT E. JENKINS, AND
ERNEST A. LACHNER

*Smithsonian Institution, Washington, D.C., and
Roanoke College, Salem, Virginia*



Noturus flavipinnis, the yellowfin madtom, was described (Taylor, 1969: 201) from specimens collected between 1884 and 1893. Specimens were known with certainty from only three widely separated localities in the Tennessee River drainage of Georgia, Tennessee, and Virginia. Lack of recent collections led to the suggestion that it might be extinct. In May 1969, Jenkins took one adult specimen from Copper Creek, Virginia, a tributary of the Clinch River in the upper Tennessee drainage. Subsequently we have found, particularly from night collecting, that *Noturus flavipinnis* is fairly common in lower Copper Creek. Another specimen taken in the Powell River, also upper Tennessee River drainage, during 1968 was received from Richard B. Fitz.

Because the species is known from only 13 faded specimens, our purpose herein is to present further descriptive, distributional, and ecological data and to illustrate the species from recently collected material.

New Material Studied: TENNESSEE: Hancock County: Powell River, mile 106, Alanthus Hill, 4 October 1968, Richard B. Fitz, USNM 204864 (1 specimen, 34 mm standard length). VIRGINIA: Scott County: Copper Creek localities: along route 627, 1.1 road mi. upstream from jct. routes 627 and 665, 11 October 1969, USNM 204856 (11, 24-65 mm); along route 627, 1.3 road mi. downstream from jct. routes 627 and 665, 10-11 October 1969, USNM 204857 (17, 24-84 mm); at route 665 bridge, at Spivey Mills, 9 May 1969, USNM 204858 (1, 67 mm); at route 671 bridge, about 7.2 mi. NE. Gate City, 13 September 1969,

USNM 204859 (1, 26 mm). See Taylor (1969: 201) for data concerning the early collections.

General Description: The following summary of meristic characteristics includes the data from the old material (see Taylor, 1969: 201-204; original description) and from the recently obtained specimens. A study of the data from each locality does not indicate significant geographic variation: dorsal rays 1,6 (44 specimens); anal rays 14 (14), 15 (23), 16 (7), mean 14.8; lower-half caudal rays 25 (11), 26 (9), 27 (15), 28 (9), mean 26.5; upper-half caudal rays 29 (4), 30 (7), 31 (11), 32 (9), 33 (9), 34 (3), 35 (1), mean 31.6; total caudal rays 54 (3), 55 (3), 56 (5), 57 (9), 58 (5), 59 (8), 60 (3), 61 (4), 62 (3), 63 (1), mean 58.1; vertebrae, excluding the anterior fused vertebrae, 33 (2), 34 (21), 35 (21), mean 34.4; preanal vertebrae, except fused vertebrae, 12 (16), 13 (14), mean 12.5; pelvic rays i,7 (2 sides), i,8 (86), mean i,8.0; pectoral rays I,7 (21 sides), I,8 (66), I,9 (1), mean I,7.8; preoperculo-mandibular pores 9 (2 sides), 10 (16), 11 (69), 12 (1), mean 10.8; internasal pores 1 (4 sides), 2 (84), mean 2.0.

We find one epural in 22 specimens counted and six hypurals (17 specimens; see Taylor, 1969: 8 for definition). The hypurals remain separate in small specimens, but in those larger than 60 mm in standard length there is considerable fusion. In all cases (15 examples) hypurals 2 and 3 are fused in these larger specimens and hypurals 4 and 5 are joined or tend to join; in one case hypurals 4 and 5 join with hypural 6.

The upper simple rays of the caudal fin number 22 to 27, modally 24, mean 23.7; 7 or 8, exceptionally 11, modally 8, mean 7.7 are upper branched rays and 9 to 13, modally 11, mean 10.8 are lower branched rays, totalling 16 to 22, mean 18.5 branched rays; and 13 to 18, modally 15, mean 15.5 are lower simple rays.

The caudal fin of the fresh material is best described as truncate, rather than rounded or pointed behind, with rounded corners. The mouth is definitely included with the lower jaw inferior. Many of our present specimens are large but they do not exceed the maximum size stated in the original description.

Color in Preservation: Side of body moderately light to darkly pigmented, brownish tan, except where overlain by the four prominent dorsal saddles or bars; dark brown saddle beneath dorsal fin extending from about midway between head and dorsal spine backward to beneath the third, almost to the fourth, dorsal ray and downward variably to below the lateral line; this saddle encloses, except in large dark specimens where obscured, a pair of light spots just anterior to the dorsal fin; the spots are similar to those found in *Noturus stigmatosus* Taylor and *Noturus munitus* Suttkus and Taylor; a second saddle, rectangular and of same color, with greatest dimension longitudinal, between dorsal and adipose fins; the dark brown to black adipose bar extends to the virtual margin of the adipose fin except in some juveniles where the outer third of the fin

may be unpigmented; a dark brown obovate patch on the posterior end of the caudal peduncle extends almost vertically above and below, across the procurent rays as a black bar; caudal fin yellowish to light brown basally with a broad crescentic brown band near margin and one or more narrow ones more proximally; distal margin of caudal fin and upper and lower areas on procurent rays behind basicaudal bar immaculate; adipose fin, outside the saddle, yellowish with some scattered chromatophores, especially anteriorly, its posterior flap without or with little pigment; anal fin lightly pigmented on basal one-fourth, with a dark brown to blackish spot, similar to that in *Noturus flavater*, near middle of anal fin base and on adjacent caudal peduncle in most specimens; a narrow blackish band across rays, at junction of basal two-thirds and distal one-third of anal fin; pelvic fin unpigmented except base which has scattered chromatophores; pectoral fin with clear tips of rays, brownish basally and near spine which is grayish brown; basal one-fourth of dorsal fin and dorsal spine, except tip, grayish brown; one or two narrow brown bands extend through the approximate middle of the dorsal fin from the first to the last soft ray; distal one-fourth of dorsal fin, tip of dorsal spine, and its filament immaculate; top of head dark grayish; a light spot, size of eye, behind eye; scattered chromatophores on cheek; a dark brown bar at posterior end of head extending downward to the branchiostegal membrane; another from the operculum through the eye to the nares; anterior nares pigmented about base, clear distally; upper barbels brown; lower outer barbels with scattered brown pigment, the inner ones with little or no pigment; undersurface unpigmented except brownish chromatophores anterior to barbels and in a faint band across abdomen just in front of pelvic fins; about half the specimens have a dark brown wedge-shaped spot on lower side just above the vent.

The greatest contrast in color pattern exists between young and adult specimens collected at night which is apparently also typical of most mottled forms of *Noturus*. Specimens collected in daylight are more uniformly pigmented with less contrast between the lighter and darker areas of pigmentation. In general young specimens have the characteristic pigmentation of older, non-breeding specimens but sometimes the pattern may be incompletely developed, as in some of the present small specimens in which the adipose bar extends variably across that fin.

Life Colors (from specimens observed at night in October, 1969, collected with seine and recorded some two to three hours after preservation): axial streak pinkish orange; adipose bar and basicaudal bar jet black; two anterior saddles dark gray to dark grayish black; pelvic fins whitish; lower surface body and head whitish, faintly tinged with yellowish; side of body where lightest tinged with yellow, yellowish tan to yellowish gray; yellow most intense on upper surface of body where darker yellowish tan to yellowish gray; cheek yellow; clear and lightly pigmented area of adipose fin medium lemon yellow; basal half caudal fin medium yellow, the caudal crescents dark grayish black, and the distal



FIG. 1 [Dorsal view]. *Noturus miurus* Jordan (male; 52.4 mm standard length) UMMZ 165840; Michigan: Huron River, 1.75 mi. above Dexter, Washtenaw County.

margin whitish; dorsal fin light yellowish gray basally and light yellow distally; tips and filaments of dorsal and pectoral spines bright lemon yellow; light area of pectoral fin light yellowish white; anal fin light yellowish gray basally and medium yellow distally; bands through dorsal and anal fins dark brownish black.

Ecology: Copper Creek flows through a rather narrow U-shaped valley. It consists of generally short, rather swift riffles and moderate to moderately long, shallow pools, which are normally not more than four feet deep, mostly less than three feet. The stream width ranges up to about 60 feet with riffles 30 to 60 feet wide. The water is white, without evidence of harmful waste or pollution. Higher vegetation is sparse and at most provides only limited cover for fishes. The bottom is mostly of gravel and rubble, with some boulders and bedrock. Small areas of fine sand are present, but there is no shifting sand. The current



FIG. 2 [Dorsal view]. *Noturus flavater* Taylor (male, holotype; 102.9 mm standard length) UMMZ 151322; Missouri: Flat Creek, Hwy. M39, 12 mi. NE. Cassville, Barry County.



FIG. 3 [Dorsal view]. *Noturus flavipinnis* Taylor (male; 65 mm standard length) USNM 204857; Virginia: Copper Creek, 1.3 mi. below junction routes 627 and 665, Scott County.

in the pools is slow to still. A very thin layer of fine silt covers the bottom of some of the pools, causing the water to become slightly turbid when roiled.

The fauna of Copper Creek is comparatively rich. We were able to collect 44 species of fishes from the lower locality (see data for USNM 204857) in a night and short day collection. Significant new records from Copper Creek for the upper Clinch River system in Virginia are *Ichthyomyzon bdellium* (Jordan), *Notropis lirus* (Jordan), *Ictalurus melas* (Rafinesque) (introduced?), *Noturus eleutherus* Jordan, *Noturus flavus* Rafinesque, *Etheostoma camurum* (Cope), *Etheostoma maculatum* Kirtland, *Etheostoma stigmaeum* (Jordan), *Etheostoma tippecanoe* Jordan and Evermann, *Etheostoma* (*Catonotus*) species, *Percina aurantiaca* (Cope), *Percina burtoni* Fowler, *Percina caprodes* (Rafinesque), *Percina evides* (Jordan and Copeland), *Percina macrocephala* (Cope), and *Percina sciera* (Swain).



FIG. 4. *Noturus flavipinnis* Taylor (female; 62 mm standard length) USNM 204856; Virginia: Copper Creek, 1.1 mi. above junction routes 627 and 665, Scott County.

The one specimen of *Noturus flavus* from Copper Creek was collected among large rubble from a swift riffle at our lower locality. Fourteen *Noturus eleutherus* were obtained in our two night collections on 10 and 11 October 1969. Large individuals of *N. eleutherus* were obtained only from the swifter gravel and rubble riffles. The young of *N. eleutherus* were taken mainly from the riffles, but some may have been collected from pools.

Noturus flavipinnis appears to be characteristically a species of the pools and slow running water. None was taken from riffles. Adults and young were often taken from shallow areas, among felled trees, or with detritus. Jordan (1890: 143, as *Noturus miurus*) found *N. flavipinnis* to be "Not rare in the weeds . . ." We found very little vegetation in Copper Creek and conclude that it does not furnish an effective hiding place.

The success of seining *N. flavipinnis* (as well as other *Noturus*) at night sharply contrasts with that during daylight. A total of only two specimens was taken in the approximately 26 daylight collections from lower Copper Creek, made from 1965 through 1969. In contrast, our two night collections yielded 28 specimens. Although the vast majority of the many Tennessee drainage collections, by others, were made during the day, we still regard *N. flavipinnis* as a rare and endangered species that has probably disappeared from much of its former range.

The past occurrence of *N. flavipinnis* in the Clinch River is based on its capture in 1893. Recently, a devastating alkaline waste kill of fishes during June 1967 that began at Carbo, Russell County, Virginia may have wiped out any existing populations in the main stream down to the Virginia-Tennessee state line.

Remarks: In most of the newly collected specimens the black bar extends to the margin or submargin of the adipose fin, but in several of the medium size specimens USNM 204857, the bar shows various extensions into that fin; these data thus disagree with statements made by Taylor (1969: 131, 201, 202) in his key and description.

The relationship of *flavipinnis* appears closest to *Noturus miurus* Jordan and secondly to *Noturus flavater* Taylor but several features suggest members of the *furiosus* species group as described by Taylor (1969: 130, 167). Characteristics which suggest the *furiosus* group are the similarly colored dorsal fins in the absence of a terminal black blotch but with variously developed medial brownish bands, typically two lightly pigmented spots in the dorsal saddle just anterior to the dorsal spine (compare figs. 1-3 and Taylor, 1969: pl. 18), a fairly truncate posterior margin of the caudal fin rather than rounded to pointed, and the increased frequency of seven soft pectoral rays. The general coloration, however, especially the color patterns of the caudal fin, the caudal peduncle, and the adipose fin, and the increased number of caudal rays point strongly to relationship with the *miurus* species group (Taylor, 1969: 131, 188).

Acknowledgments: We are grateful to Richard B. Fitz, Tennessee Valley Authority, Norris, Tennessee, for sending us a specimen from the Powell River. Noel M. Burkhead and William T. Shuler, Roanoke College students, assisted in field work. The photographs of *Noturus miurus* and *Noturus flavater* were made by the University of Michigan Photographic Services and those of *Noturus flavipinnis* by the Photographic Services Division, Smithsonian Institution.

LITERATURE CITED

- JORDAN, DAVID STARR. 1890. Report of explorations made during the summer and autumn of 1888 in the Allegheny region of Virginia, North Carolina, and Tennessee, and in western Indiana, with an account of the fishes found in each of the river basins of those regions. Bull. U.S. Fish. Comm., vol. 8: 97-173.
- TAYLOR, WILLIAM R. 1969. A revision of the catfish genus *Noturus* Rafinesque, with an analysis of higher groups in the Ictaluridae. U.S. Nat. Mus. Bull. 282: 1-315, pls. 1-21.

